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May 20, 2013

Final Independent External Peer Review Report Willamette River Floodplain Restoration Study, Lower Coast and Middle Forks Subbasins, Oregon



Prepared by
Battelle Memorial Institute

Prepared for
Department of the Army
U.S. Army Corps of Engineers
Ecosystem Restoration Planning Center of Expertise
for the St. Paul District

Contract No. W912HQ-10-D-0002
Task Order: 0037

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by

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505 King Avenue
Columbus, OH 43201

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EXECUTIVE SUMMARY

Project Background and Purpose

The Willamette River Basin of western Oregon is a major tributary of the Columbia River and is the tenth largest river in the United States, based on average annual flow. Sensitive fish and wildlife species have been significantly impacted by development and industry along this major river, and alternatives are being evaluated for restoring ecosystem functions to various reaches of the river. This study is being conducted in phases due to the large size and complexity of the Willamette River Basin. Phase 1 of the study involved the development of a framework level plan for the entire Willamette Basin. The 2004 Willamette Restoration Initiative (WRI) documented conditions in the basin and strategies to recover fish and wildlife species as part of the Columbia River Basin Fish and Wildlife Program. Phase 2, the subject of this study, investigates the feasibility of various floodplain restoration opportunities in the lower Coast and Middle Forks of the Willamette River.

The Coast Fork and Middle Fork subbasins are located in the southern portion of the Willamette River Basin. These particular subbasins were chosen for the Phase 2 study for several reasons. First, several opportunities exist below the dams to restore natural floodplain functions. Second, USACE dams and bank protection projects, among other activities, have significantly altered hydrologic and hydraulic conditions in these subbasins, and it is appropriate for USACE to take the lead in restoring more natural floodplain functions to these subbasins. Third, the high percentage of public land ownership in these subbasins, as compared to other major tributaries and the mainstem Willamette, increases the likelihood that a cost-effective, integrated restoration plan can be implemented. Finally, there is a high degree of interest in floodplain restoration among stakeholders and potential sponsors in these subbasins.

The Coast Fork Willamette River subbasin covers an area of about 665 square miles within the Calapooya Mountains (Western Cascades province) and the floor of the Willamette Valley. The river is approximately 40 miles long and joins the Middle Fork Willamette near Eugene to form the mainstem Willamette River. Big River and Saroute Creek in the Calapooya Mountains join to form the Coast Fork Willamette River. The Row River, the largest tributary, drains nearly 60% of the Coast Fork subbasin and joins the Coast Fork Willamette River just below the City of Cottage Grove. Two dams divide the Coast Fork subbasin: Cottage Grove on the Coast Fork Willamette at RM 29 and Dorena on the Row River. These dams limit upstream fish passage and greatly influence downstream hydrologic regimes, temperature patterns, sediment and bedload transport, and large wood delivery to the lower reaches.

This study is focused on the floodplain of the Coast Fork Willamette River below Cottage Grove dam to the confluence with the Middle Fork Willamette River. This lower floodplain area is the primary area of interest for restoring natural floodplain processes and habitats. The lower mile of the Row River is also considered in this study.

The Middle Fork Willamette River subbasin covers an area of approximately 1,360 square miles (865,920 acres) on the western slope of the Cascade Mountains and the floor of the Willamette Valley. The river is 84 miles long and joins the Coast Fork Willamette River near Eugene to form the mainstem Willamette River. The Middle Fork Willamette River originates in two connecting lakes formed by lava flows: Opal and Timpanogas Lakes in the Willamette National Forest. The headwaters of the subbasin are characterized by two major physiographic provinces: the High Cascades and the Western Cascades provinces (Franklin and Dyrness 1988).

As the leading land use in the subbasin, commercial forestry has contributed to degradation of fish habitat by modifying hydrology and increasing sediment inputs and water temperatures. Mature and old-growth forest currently occupy about 36% of the Hills Creek Reservoir drainage, which has been estimated to be a loss of 55% from historic conditions (Northwest Power and Conservation Council 2004 Subbasin Plan). The lower subbasin is dominated by agricultural and urban land uses that constrain the river's ability to meander and have resulted in the removal of much of the riparian gallery forest. The North Fork of the Middle Fork Willamette River is a designated National Wild and Scenic River. This study is primarily focused on the floodplain below Dexter dam to the confluence with the Coast Fork Willamette River. This lower floodplain area is the primary area of interest for this study for restoring natural floodplain processes and habitats. The upper subbasin has a narrower valley and floodplain.

The purpose of this floodplain restoration feasibility study is to evaluate alternatives for restoring natural floodplain functions along the lower Coast and Middle Forks Willamette River. These functions include fish and wildlife habitat, groundwater recharge, flood storage, and sediment and erosion processes. This project is essential because of the need to restore large floodplain sites that contribute to the recovery of sensitive fish and wildlife species in the subbasins. Without Federal action, other stakeholders in the subbasins would not have the funds or means to accomplish this same scale of restoration. Because of the substantial changes in natural riverine and floodplain processes due to the construction of multiple dams and revetments in the subbasins, the habitats that sustain fish and wildlife populations are disappearing by becoming degraded or developed. Large-scale restoration of floodplains provides the best opportunity to encourage the natural formation of habitats and provide important off-channel rearing and refuge habitats for multiple species. Floodplains will likely become even more important for dissipating high energy and high flows as climate change occurs. It is likely that winter snowpack in the Pacific Northwest will decline, whereas more variable rainfall will lead to higher peak runoff events and lower sustained flows. Floodplains help moderate peak runoff events and allow groundwater recharge that contributes to the maintenance of low flows.

Independent External Peer Review Process

The U.S. Army Corps of Engineers (USACE) is conducting an Independent External Peer Review (IEPR) of the March 2013 Willamette River Floodplain Restoration Study Draft

Integrated Feasibility Report/Environmental Assessment (FR/EA) for the Lower Coast and Middle Forks Subbasins (hereinafter the Willamette River IEPR). As a 501(c)(3) non-profit science and technology organization, Battelle is independent, is free from conflicts of interest (COIs), and meets the requirements for an Outside Eligible Organization (OEO) per guidance described by USACE (2012a, 2012b). Battelle has experience in establishing and administering peer review panels for USACE and was engaged to coordinate the IEPR of the Willamette River Floodplain Restoration project. Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analyses. The IEPR was external to the agency and conducted following USACE and Office of Management and Budget (OMB) guidance described in USACE (2012a, 2012b) and OMB (2004). This final report describes the IEPR process, describes the panel members and their selection, and summarizes the Final Panel Comments of the IEPR Panel (the Panel).

Based on the technical content of the Willamette River review documents and the overall scope of the project, Battelle identified candidates for the Panel in the following key technical areas: hydraulic, hydrology, and geomorphology Engineering; cost engineering; environmental compliance/biology; and Civil Works planning. Four panel members were selected for the IEPR from more than 20 candidates identified. USACE was given the list of candidate panel members, but Battelle made the final selection of the Panel.

The Panel received an electronic version of the 1,122-page FR/EA, along with a charge that solicited comments on specific sections of the documents (totaling 985 pages) to be reviewed. USACE prepared the charge questions following guidance provided in USACE (2012a, 2012b) and OMB (2004), which were included in the draft and final Work Plans.

The USACE Project Delivery Team briefed the Panel and Battelle during a kick-off meeting held via teleconference prior to the start of the review to provide the Panel an opportunity to ask questions of USACE and clarify uncertainties. A mid-review teleconference was also held to give the Panel an opportunity to ask additional clarifying questions once they had an opportunity to review the documentation more thoroughly. Other than these teleconferences, there was no direct communication between the Panel and USACE during the peer review process. The Panel produced approximately 80 individual comments in response to the 26 charge questions.

IEPR panel members reviewed the Willamette River documents individually. The panel members then met via teleconference with Battelle to review key technical comments, discuss charge questions for which there were conflicting responses, and reach agreement on the Final Panel Comments to be provided to USACE. Each Final Panel Comment was documented using a four-part format consisting of: (1) a comment statement; (2) the basis for the comment; (3) the significance of the comment (high, medium, or low); and (4) recommendations on how to resolve the comment. Overall, 15 Final Panel Comments were identified and documented. Of these, 2 were identified as having high significance, 9 had medium significance, and 4 had low significance.

Results of the Independent External Peer Review

The panel members agreed among themselves on their "assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used" (USACE, 2012a, 2012b; p. D-4) in the Willamette River review documents. They agreed that the process for selecting alternatives for the recommended restoration plan was well presented and supported. However, they also agreed that additional information should be provided to further support the alternatives selection process, cost engineering, and how the recommended restoration plan will meet the project objectives. Table ES-1 lists the Final Panel Comments statements by level of significance. The full text of the Final Panel Comments is presented in Appendix A of this report. The following summarizes the Panel's findings.

Plan Formulation – The planning reflected in the Willamette River Draft Integrated FR/EA is thorough and logical. The planning tools and models employed in the process were applied appropriately and effectively. The alternative plans were formulated and compared in a balanced platform that adequately accounted for ecological principles while considering real world constraints. The planning was conducted in a collaborative environment and resulted in a high quality and realistic recommended restoration plan.

However, the monitoring and adaptive management plan does not include the details necessary to promote optimum usefulness during project development and the monitoring period. The Panel believes the monitoring protocols should be specific and based on accepted standard procedures as documented in the peer-reviewed literature, such as Measuring and Monitoring Biological Diversity: Standard Methods for Amphibians (Heyer et al. 1994) or the Stream Barrier Removal Monitoring Guide (Collins et al. 2007), or based on the best professional judgment of a team of local experts. The methods should be focused on determining whether project objectives are being achieved. Established targets should be correlated to projected ecological outputs to ensure that appropriate adaptive management measures will be implemented when necessary to achieve the stated project objectives.

Engineering – The analysis tools and methodology are suitable and commonly used for this type of application. The level of analysis conducted is adequate for this level of design. However, more detailed hydraulic and geomorphic analyses are necessary to refine the design and optimize project objectives. Project implementation should produce immediate beneficial geomorphic effects, but the long-term benefits are uncertain and require additional evaluation. A better understanding of historic bedload quantities and the importance of bedload to natural geomorphic process in the reach is necessary to evaluate and understand the long-term expected conditions.

Economics – The project cost considerations are well planned and executed for this project. The selection of alternatives is very well done, simple, straightforward, and easily followed. The presentation of costs for the alternatives is especially well done and made it much easier for the Panel to understand the alternatives selection process. However, the Panel has concerns about the level of detail given in explaining the cost analysis methods used, including the selection of contingency values, the discount rate to be applied over time, and the method for calculating annualized cost values.

Environmental – The environmental components of the recommended restoration plan are adequately scoped and address the key biological objectives. The Panel found that measures pertaining to invasive species management and large woody debris (LWD) establishment may not be self-sustaining and require perpetual maintenance. It is not clear how this will be addressed. The monitoring and adaptive management plan does not provide adequate details to confirm that applicable metrics will be developed for evaluating the success of the project goals. The Panel also believes that the understanding of the report would be enhanced by briefly summarizing why other non-engineering alternatives such as dam operation (e.g., hydrologic modification) were eliminated from consideration during earlier phases of this project and by clearly describing how the specific habitat restoration elements fulfill endangered species Primary Constituent Element (PCE) requirements.

Table ES-1. Overview of 15 Final Panel Comments Identified by the Willamette River IEPR Panel

No.	Final Panel Comment
	Significance – High
1	Certain design features of the recommended restoration plan may not be self-sustaining and may require perpetual maintenance.
2	The long-term benefits of floodplain connectivity and natural processes cannot be determined because the degree to which the sediment, gravel, and wood supply has been reduced and the importance of this supply to meeting project objectives are not clear.
	Significance – Medium
3	The transport of wood and gravel from above the dams is identified as a restoration opportunity but not carried forward into the development of restoration alternatives.
4	It is not clear how certain alternatives, such as dam operation modification, were removed from consideration for this study.
5	It is not clear how the “bullfrog constraint” was used in the formulation of project alternatives, nor is it clear how maintaining a depth of less than 6 feet will minimize bullfrog habitat.
6	Potential limitations in channel bank or bedform survey data may yield hydraulic model results that are not representative of current conditions.
7	The monitoring and adaptive management plan does not fully explain how project targets were derived or if successfully meeting targets is an indication that the proposed project benefits are being met.
8	Monitoring and evaluating the biological and physical responses may not be possible based on the proposed monitoring plan protocols.
9	Expected impacts on the existing fringe wetlands from implementing the recommended restoration plan have not been quantified, and there is no description of how these impacts will be addressed.

Table ES-1. Overview of 15 Final Panel Comments Identified by the Willamette River IEPR Panel (continued)

No.	Final Panel Comment
10	The Primary Constituent Elements of the targeted species that are listed under the Endangered Species Act are not specifically linked to elements of the recommended restoration plan.
11	The basis for the selected discount rate of 3.75% for the economic analysis and costing for the life of the project is not explained, and a sensitivity analysis is not provided to demonstrate potential differences in total project costs if the discount rate changes over time.
	Significance – Low
12	The basis for the contingencies applied in the cost analysis is not explained.
13	The Work Breakdown Structure in the Project Cost Summary does not provide enough detail to identify how the costs are being distributed across the different work elements.
14	The rationale for non-ecologically based decisions and whether they affected the selection of the recommended restoration plan is not discussed.
15	There are inconsistencies in the presentation and discussion of project goals and objectives in the documentation.

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LIST OF ACRONYMS

ATR	Agency Technical Review
COI	Conflict of Interest
DrChecks	Design Review and Checking System
ESA	Endangered Species Act
FR/EA	Feasibility Report/Environmental Assessment
H&H	hydraulic and hydrologic
HEP	Habitat Evaluation Procedure
HSI	Habitat Suitability Index
IEPR	Independent External Peer Review
LWD	large woody debris
LWRC	Louisiana Water Resources Council
NTP	Notice to Proceed
OEO	Outside Eligible Organization
OMB	Office of Management and Budget
PCE	Primary Constituent Element
PDT	Project Delivery Team
USACE	United States Army Corps of Engineers
WBS	Work Breakdown Structure
WRDA	Water Resources Development Act
WRI	Willamette Restoration Initiative

1. INTRODUCTION

The Willamette River Basin of western Oregon is a major tributary of the Columbia River and is the tenth largest river in the United States, based on average annual flow. Sensitive fish and wildlife species have been significantly impacted by development and industry along this major river, and alternatives are being evaluated for restoring ecosystem functions to various reaches of the river. This study is being conducted in phases due to the large size and complexity of the Willamette River Basin. Phase 1 of the study involved the development of a framework level plan for the entire Willamette Basin. The 2004 Willamette Restoration Initiative (WRI) documented conditions in the basin and strategies to recover fish and wildlife species as part of the Columbia River Basin Fish and Wildlife Program. Phase 2, the subject of this study, investigates the feasibility of various floodplain restoration opportunities in the lower Coast and Middle Forks of the Willamette River.

The Coast Fork and Middle Fork subbasins are located in the southern portion of the Willamette River Basin. These particular subbasins were chosen for the Phase 2 study for several reasons. First, several opportunities exist below the dams to restore natural floodplain functions. Second, USACE dams and bank protection projects, among other activities, have significantly altered hydrologic and hydraulic conditions in these subbasins, and it is appropriate for USACE to take the lead in restoring more natural floodplain functions to these subbasins. Third, the high percentage of public land ownership in these subbasins, as compared to other major tributaries and the mainstem Willamette, increases the likelihood that a cost-effective, integrated restoration plan can be implemented. Finally, there is a high degree of interest in floodplain restoration among stakeholders and potential sponsors in these subbasins.

The Coast Fork Willamette River subbasin covers an area of about 665 square miles within the Calapooya Mountains (Western Cascades province) and the floor of the Willamette Valley. The river is approximately 40 miles long and joins the Middle Fork Willamette near Eugene to form the mainstem Willamette River. Big River and Saroute Creek in the Calapooya Mountains join to form the Coast Fork Willamette River. The Row River, the largest tributary, drains nearly 60% of the Coast Fork subbasin and joins the Coast Fork Willamette River just below the City of Cottage Grove. Two dams divide the Coast Fork subbasin: Cottage Grove on the Coast Fork Willamette at RM 29 and Dorena on the Row River. These dams limit upstream fish passage and greatly influence downstream hydrologic regimes, temperature patterns, sediment and bedload transport, and large wood delivery to the lower reaches.

This study is focused on the floodplain of the Coast Fork Willamette River below Cottage Grove dam to the confluence with the Middle Fork Willamette River. This lower floodplain area is the primary area of interest for restoring natural floodplain processes and habitats. The lower mile of the Row River is also considered in this study.

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connecting lakes formed by lava flows: Opal and Timpanogas Lakes in the Willamette National Forest. The headwaters of the subbasin are characterized by two major physiographic provinces: the High Cascades and the Western Cascades provinces (Franklin and Dyrness 1988).

As the leading land use in the subbasin, commercial forestry has contributed to degradation of fish habitat by modifying hydrology and increasing sediment inputs and water temperatures. Mature and old-growth forest currently occupy about 36% of the Hills Creek Reservoir drainage, which has been estimated to be a loss of 55% from historic conditions (Northwest Power and Conservation Council 2004 Subbasin Plan). The lower subbasin is dominated by agricultural and urban land uses that constrain the river's ability to meander and have resulted in the removal of much of the riparian gallery forest. The North Fork of the Middle Fork Willamette River is a designated National Wild and Scenic River. This study is primarily focused on the floodplain below Dexter dam to the confluence with the Coast Fork Willamette River. This lower floodplain area is the primary area of interest for this study for restoring natural floodplain processes and habitats. The upper subbasin has a narrower valley and floodplain.

The purpose of this floodplain restoration feasibility study is to evaluate alternatives for restoring natural floodplain functions along the lower Coast and Middle Forks Willamette River. These functions include fish and wildlife habitat, groundwater recharge, flood storage, and sediment and erosion processes. This project is essential because of the need to restore large floodplain sites that contribute to the recovery of sensitive fish and wildlife species in the subbasins. Without Federal action, other stakeholders in the subbasins would not have the funds or means to accomplish this same scale of restoration. Because of the substantial changes in natural riverine and floodplain processes due to the construction of multiple dams and revetments in the subbasins, the habitats that sustain fish and wildlife populations are disappearing by becoming degraded or developed. Large-scale restoration of floodplains provides the best opportunity to encourage the natural formation of habitats and provide important off-channel rearing and refuge habitats for multiple species. Floodplains will likely become even more important for dissipating high energy and high flows as climate change occurs. It is likely that winter snowpack in the Pacific Northwest will decline, whereas more variable rainfall will lead to higher peak runoff events and lower sustained flows. Floodplains help moderate peak runoff events and allow groundwater recharge that contributes to the maintenance of low flows.

The objective of the work described here was to conduct an Independent External Peer Review (IEPR) of the Willamette River Floodplain Restoration Study, Lower Coast and Middle Forks Subbasins, Oregon (hereinafter Willamette River) in accordance with procedures described in the Department of the Army, U.S. Army Corps of Engineers (USACE) Engineer Circular *Civil Works Review* (EC 1165-2-214; USACE, 2012b) and Office of Management and Budget (OMB) bulletin *Final Information Quality Bulletin for Peer Review* (OMB, 2004). Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analyses.

This final report details the IEPR process, describes the IEPR panel members and their selection, and summarizes the Final Panel Comments of the IEPR Panel on the existing environmental, economic, and engineering analyses contained in the Willamette River IEPR. The full text of the Final Panel Comments is presented in Appendix A.

2. PURPOSE OF THE IEPR

To ensure that USACE documents are supported by the best scientific and technical information, USACE has implemented a peer review process that uses IEPR to complement the Agency Technical Review (ATR), as described in USACE (2012a, 2012b).

In general, the purpose of peer review is to strengthen the quality and credibility of the USACE decision documents in support of its Civil Works program. IEPR provides an independent assessment of the economic, engineering, and environmental analysis of the project study. In particular, the IEPR addresses the technical soundness of the project study's assumptions, methods, analyses, and calculations and identifies the need for additional data or analyses to make a good decision regarding implementation of alternatives and recommendations.

In this case, the IEPR of the Willamette River was conducted and managed using contract support from Battelle, which is an Outside Eligible Organization (OEO) (as defined by EC No. 1165-2-214) under Section 501(c)(3) of the U.S. Internal Revenue Code with experience conducting IEPRs for USACE.

3. METHODS

This section describes the method followed in selecting the members for the IEPR Panel (the Panel) and in planning and conducting the IEPR. The IEPR was conducted following procedures described by USACE (2012a, 2012b) and in accordance with OMB (2004) guidance. Supplemental guidance on evaluation for conflicts of interest (COIs) was obtained from the *Policy on Committee Composition and Balance and Conflicts of Interest for Committees Used in the Development of Reports* (The National Academies, 2003).

3.1 Planning and Schedule

At the beginning of the Period of Performance, Battelle held a kick-off meeting with USACE to review the preliminary/suggested schedule, discuss the IEPR process, and address any questions regarding the scope (e.g., clarify expertise areas needed for panel members). Any revisions to the schedule were submitted as part of the final Work Plan. In addition, 26 charge questions were provided by USACE and included in the draft and final Work Plans. The final charge also included general guidance for the Panel on the conduct of the peer review (provided in Appendix B of this final report).

Table 1 presents the schedule followed in executing the IEPR. Due dates for milestones and deliverables are based on the award/effective date of March 4, 2013. The review documents were provided by USACE on March 4, 2013. Note that the work items listed in Task 6 occur after the submission of this report. Battelle will enter the 15 Final Panel Comments developed by the Panel into USACE's Design Review and Checking System (DrChecks), a Web-based software system for documenting and sharing comments on reports and design documents, so that USACE can review and respond to them. USACE will provide responses (Evaluator Responses) to the Final Panel Comments, and the Panel will respond (BackCheck Responses) to the Evaluator Responses. All USACE and Panel responses will be documented by Battelle. Battelle will

provide USACE and the Panel a pdf printout of all DrChecks entries, through comment closure, as a final deliverable and record of the IEPR results.

Table 1. Willamette River IEPR Schedule

Task	Action	Due Date
1	Award/Effective Date	3/4/2013
	Review documents available	3/4/2013
	Battelle submits draft Work Plan[a]	3/11/2013
	USACE provides comments on draft Work Plan	3/14/2013
	Battelle submits final Work Plan	3/18/2013
2	Battelle requests input from USACE on the conflict of interest (COI) questionnaire	3/8/2013
	USACE provides comments on COI questionnaire	3/11/2013
	Battelle submits list of selected panel members[a]	3/13/2013
	USACE confirms the Panel has no conflicts of interest	3/26/2013
	Battelle completes subcontracts for panel members	3/27/2013
	Battelle submits draft charge provided by USACE (combined with draft Work Plan – Task 1)	3/11/2013
	USACE reviews and finalizes charge	3/14/2013
	Battelle submits final charge provided by USACE (combined with final Work Plan – Task 1)	3/18/2013
3	USACE/Battelle hold kick-off meeting	3/12/2013
	Battelle sends review documents to IEPR Panel	3/28/2013
	Battelle convenes Panel kick-off meeting	3/29/2013
	Battelle convenes USACE/Panel kick-off meeting	3/29/2013
	Battelle convenes mid-review teleconference for panel to ask clarifying questions of USACE	4/15/2013
4	Panel members complete their individual reviews	4/19/2013
	Battelle convenes panel review teleconference	4/26/2013
	Panel members provide draft Final Panel Comments to Battelle	5/6/2013
5	Battelle submits Final IEPR Report to USACE[a]	5/20/2013
6[b]	Battelle inputs Final Panel Comments to DrChecks; Battelle provides Post-Final Panel Comment Response Process template to USACE	5/29/2013
	USACE provides draft Project Delivery Team (PDT) Evaluator Responses and clarifying questions to Battelle	6/3/2013
	Battelle, Panel, and USACE hold teleconference to discuss Final Panel Comments, draft responses, and clarifying questions	6/18/2013

Table 2. Willamette River IEPR Schedule (continued)

Task	Action	Due Date
6[b]	USACE inputs final PDT Evaluator Responses in DrChecks	6/20/2013
	Battelle inputs the Panel's BackCheck Responses in DrChecks	6/27/2013
	Battelle submits pdf printout of DrChecks project file[a]	6/27/2013
	Contract End/Delivery Date	8/30/2013

a Deliverable.

b Task6 occurs after the submission of this report.

3.2 Identification and Selection of IEPR Panel Members

The candidates for the Panel were evaluated based on their technical expertise in the following key areas: hydraulic, hydrology, and geomorphology engineering; cost engineering; environmental compliance/biology, and Civil Works planning. These areas correspond to the technical content of the Willamette River IEPR and overall scope of the Willamette River Floodplain Restoration Project.

To identify candidate panel members, Battelle reviewed the credentials of the experts in Battelle's Peer Reviewer Database, sought recommendations from colleagues, contacted former panel members, and conducted targeted Internet searches. Battelle initially identified more than 20 candidates for the Panel, evaluated their technical expertise, and inquired about potential COIs. Of these, Battelle chose the most qualified candidates and confirmed their interest and availability, and ultimately selected four experts for the final Panel. The remaining candidates were not selected for a variety of reasons, including lack of availability, disclosed COIs, or lack of the precise technical expertise required.

The candidates were screened for the following potential exclusion criteria or COIs.[1] These COI questions were intended to serve as a means of disclosure and to better characterize a candidate's employment history and background. Providing a positive response to a COI screening question did not automatically preclude a candidate from serving on the Panel. For example, participation in previous USACE technical peer review committees and other technical review panel experience was included as a COI screening question. A positive response to this question could be considered a benefit.

- Previous and/or current involvement by you or your firm[2] in the Willamette River Floodplain Restoration Study, Integrated Feasibility Report/Environmental Assessment.

[1] Battelle evaluated whether scientists in universities and consulting firms that are receiving USACE-funding have sufficient independence from USACE to be appropriate peer reviewers. See OMB (2004, p. 18), "….when a scientist is awarded a government research grant through an investigator-initiated, peer-reviewed competition, there generally should be no question as to that scientist's ability to offer independent scientific advice to the agency on other projects. This contrasts, for example, to a situation in which a scientist has a consulting or contractual arrangement with the agency or office sponsoring a peer review. Likewise, when the agency and a researcher work together (e.g., through a cooperative agreement) to design or implement a study, there is less independence from the agency. Furthermore, if a scientist has repeatedly served as a reviewer for the same agency, some may question whether that scientist is sufficiently independent from the agency to be employed as a peer reviewer on agency-sponsored projects."

[2] Includes any joint ventures in which a panel member's firm is involved and if the firm serves as a prime or as a subcontractor to a prime.

- Previous and/or current involvement by you or your firm[2] in ecosystem restoration in Willamette River Basin of western Oregon, including the lower Coast and Middle Forks of the Willamette River.
- Previous and/or current involvement by you or your firm[2] in the Willamette River Floodplain Restoration Study, Integrated Feasibility Report/Environmental Assessment related projects.
- Previous and/or current involvement by you or your firm[2] in the conceptual or actual design, construction, or operations and maintenance (O&M) of any projects associated with Willamette River Floodplain Restoration Study, Integrated Feasibility Report/Environmental Assessment related projects.
- Current employment by the U.S. Army Corps of Engineers (USACE).
- Previous and/or current involvement in paid or unpaid expert testimony related to Willamette River Floodplain Restoration Study, Integrated Feasibility Report/Environmental Assessment.
- Previous and/or current employment or affiliation with the non-Federal sponsors or any of the following cooperating Federal, State, County, local, and regional agencies, environmental organizations, and interested groups (for pay or pro bono):
    - Willamette Restoration Initiative (WRI)
    - Mid-Willamette Valley Council of Governments (MWVCOG)
    - Northwest Power Planning Council (NPPC).
- Past, current, or future interests or involvements (financial or otherwise) by you, your spouse, or your children related to the Willamette River Basin of western Oregon, including the lower Coast and Middle Forks of the Willamette River.
- Current personal involvement in other USACE projects, including whether involvement was to author any manuals or guidance documents for USACE. If yes, provide titles of documents or description of project, dates, and location (USACE district, division, Headquarters, ERDC, etc.), and position/role. Please highlight and discuss in detail any projects that are specifically with the Portland District.
- Previous or current involvement in the development or testing of models that will be used for or in support of the Willamette River Floodplain Restoration Study, Integrated Feasibility Report/Environmental Assessment project.
- Current firm[2] involvement in other USACE projects, specifically those projects/contracts that are with the Portland District. If yes, provide title/description, dates, and location (USACE district, division, Headquarters, ERDC, etc.), and position/role. Please also clearly delineate the percentage of work you personally are currently conducting for the Portland District. Please explain.
- Any previous employment by USACE as a direct employee or contractor (either as an individual or through your firm[2]) within the last 10 years, notably if those projects/contracts are with the Portland District. If yes, provide title/description, dates employed, and place of employment (district, division, Headquarters, ERDC, etc.), and position/role.

- Previous experience conducting technical peer reviews. If yes, please highlight and discuss any technical reviews concerning ecosystem restoration and include the client/agency and duration of review (approximate dates).
- Pending, current, or future financial interests in Willamette River Floodplain Restoration Study, Integrated Feasibility Report/Environmental Assessment related contracts/awards from USACE.
- A significant portion (i.e., greater than 50%) of personal or firm[2] revenues within the last three years came from USACE contracts.
- A significant portion (i.e., greater than 50%) of personal or firm[2] revenues within the last three years from contracts with the non-Federal sponsor.
- Any publicly documented statement (including, for example, advocating for or discouraging against) related to Willamette River Floodplain Restoration Study, Integrated Feasibility Report/Environmental Assessment.
- Participation in relevant prior Federal studies relevant to this project and/or Willamette River Floodplain Restoration Study, Integrated Feasibility Report/Environmental Assessment.
- Previous and/or current participation in prior non-Federal studies relevant to this project and/or Willamette River Floodplain Restoration Study, Integrated Feasibility Report/Environmental Assessment.
- Is there any past, present, or future activity, relationship, or interest (financial or otherwise) that could make it appear that you would be unable to provide unbiased services on this project?

Other considerations:

- Participation in previous USACE technical review panels
- Other technical review panel experience.

In selecting the final members of the Panel, Battelle chose experts who best fit the expertise areas and had no COIs. One of the four final reviewers is affiliated with an academic institution and the other three are affiliated with a consulting company or were independent consultants. Battelle established subcontracts with the panel members when they indicated their willingness to participate and confirmed the absence of COIs through a signed COI form. USACE was given the list of candidate panel members, but Battelle made the final selection of the Panel. Section 4 of this report provides names and biographical information on the panel members.

3.3 Conduct of the IEPR

Prior to beginning their review and within 2 days of their subcontracts being finalized, all members of the Panel attended a kick-off meeting via teleconference planned and facilitated by Battelle in order to review the IEPR process, the schedule, communication procedures, and other pertinent information for the Panel. Battelle planned and facilitated a second kick-off meeting via teleconference during which USACE presented project details to the Panel. Before the meetings, the IEPR Panel received an electronic version of the final charge as well as the Willamette River

review documents and reference materials listed below. The documents and files in bold font were provided for review; the other documents, including Appendices B, D, G, H and I were provided for reference or supplemental information only.

- **Willamette River Floodplain Restoration Study, Integrated Feasibility Report and Environmental Assessment, February 2013 (207 pages)**
- **Appendix A – Conceptual Alternatives (33 pages)**
- **Appendix C – Cost Appendix (124 pages)**
- **Appendix E – Hydrology and Hydraulics (103 pages)**
- **Appendix F – Design (518 pages)**
- USACE guidance Civil Works Review, (EC 1165-2-214) dated 15 December 2012
- Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* released December 16, 2004.

Approximately half way through the review of the Willamette River Floodplain Restoration Study documents, a teleconference was held with USACE, the Panel, and Battelle so that USACE could answer any questions the Panel had concerning either the review documents or the project. Prior to this teleconference, Battelle submitted four questions from the panel members to USACE. An additional question was presented during the teleconference. USACE was able to provide responses to all of the questions during the teleconference.

3.4 Review of Individual Comments

The Panel was instructed to address the charge questions/discussion points within a charge question response table provided by Battelle. At the end of the review period, the Panel produced approximately 80 individual comments in response to the charge questions/discussion points. Battelle reviewed the comments to identify overall recurring themes, areas of potential conflict, and other overall impressions. As a result of the review, Battelle summarized the 80 comments into a preliminary list of 16 overall comments and discussion points. Each panel member's individual comments were shared with the full Panel in a merged individual comments table.

3.5 IEPR Panel Teleconference

Battelle facilitated a 4-hour teleconference with the Panel so that the panel members could exchange technical information. The main goal of the teleconference was to identify which issues should be carried forward as Final Panel Comments in the Final IEPR Report and decide which panel member would serve as the lead author for the development of each Final Panel Comment. This information exchange ensured that the Final IEPR Report would accurately represent the Panel's assessment of the project, including any conflicting opinions. The Panel engaged in a thorough discussion of the overall positive and negative comments, added any missing issues of high-level importance to the findings, and merged any related individual comments. In addition, Battelle confirmed each Final Panel Comment's level of significance to the Panel.

The Panel also discussed responses to one specific charge question where there appeared to be differing viewpoints among panel members. It was determined that the apparent differences were the result of differences in perspective because of each panel member's expertise, thus no conflict existed.

Each issue identified was incorporated into a Final Panel Comment, and one additional issue was identified during the teleconference discussions. At the end of these discussions, the Panel identified 17 comments and discussion points that should be brought forward as Final Panel Comments.

3.6 Preparation of Final Panel Comments

Following the teleconference, Battelle prepared a summary memorandum for the Panel documenting each Final Panel Comment (organized by level of significance). The memorandum provided the following detailed guidance on the approach and format to be used to develop the Final Panel Comments for the Willamette River IEPR:

- Lead Responsibility: For each Final Panel Comment, one Panel member was identified as the lead author responsible for coordinating the development of the Final Panel Comment and submitting it to Battelle. Battelle modified lead assignments at the direction of the Panel. To assist each lead in the development of the Final Panel Comments, Battelle distributed the merged individual comments table, a summary detailing each draft final comment statement, an example Final Panel Comment following the four-part structure described below, and templates for the preparation of each Final Panel Comment.
- Directive to the Lead: Each lead was encouraged to communicate directly with the other panel member as needed and to contribute to a particular Final Panel Comment. If a significant comment was identified that was not covered by one of the original Final Panel Comments, the appropriate lead was instructed to draft a new Final Panel Comment.
- Format for Final Panel Comments: Each Final Panel Comment was presented as part of a four-part structure:
    1. Comment Statement (succinct summary statement of concern)
    2. Basis for Comment (details regarding the concern)
    3. Significance (high, medium, low; see description below)
    4. Recommendation(s) for Resolution (see description below).
- Criteria for Significance: The following were used as criteria for assigning a significance level to each Final Panel Comment:
    1. High: Describes a fundamental problem with the project that could affect the recommendation, success, or justification of the project. Comments rated as high indicate that the Panel analyzed or assessed the methods, models, and/or analyses and determined that there is a "showstopper" issue.
    2. Medium: Affects the completeness of the report in describing the project, but will not affect the recommendation or justification of the project. Comments rated as medium indicate that the Panel does not have sufficient information to analyze or assess the methods, models, or analyses.

3. Low: Affects the understanding or accuracy of the project as described in the report, but will not affect the recommendation or justification of the project. Comments rated as low indicate that the Panel identified information (tables, figures, equations, discussions) that was mislabeled or incorrect or data or report sections that were not clearly described or presented.

- Guidance for Developing Recommendations: The recommendation section was to include specific actions that USACE should consider to resolve the Final Panel Comment (e.g., suggestions on how and where to incorporate data into the analysis, how and where to address insufficiencies, areas where additional documentation is needed).

During the Final Panel Comment development process, the Panel determined that 2 of the Final Panel Comments could be either dropped or merged into other Final Panel Comments; therefore, the total Final Panel Comment count was reduced from 17 to 15. Battelle reviewed and edited the Final Panel Comments for clarity, consistency with the comment statement, and adherence to guidance on the Panel's overall charge, which included ensuring that there were no comments regarding either the appropriateness of the selected alternative or USACE policy. At the end of this process, 15 Final Panel Comments were prepared and assembled. There was no direct communication between the Panel and USACE during the preparation of the Final Panel Comments. The Final Panel Comments are presented in Appendix A of this report.

4. PANEL DESCRIPTION

Candidates for the Panel were identified using Battelle's Peer Reviewer Database, targeted Internet searches using key words (e.g., technical area, geographic region), searches of websites of universities or other compiled expert sites, and referrals. Battelle screened the candidates for availability, technical background, and COIs to identify those who would be most suitable to serve on the Panel and submitted the list of candidate Panel members to USACE for feedback on any potential COI that Battelle may not have been able to identify. USACE identified a potential COI for the hydrology and hydraulic engineering expert selected. Thus, Battelle identified another expert for the hydrology and hydraulic engineering position on the Panel, and that individual was determined not to have any COI.

An overview of the credentials of the final four members of the Panel and their qualifications in relation to the technical evaluation criteria is presented in Table 2. More detailed biographical information regarding each panel member and his area of technical expertise is presented in the text that follows the table.

Table 2. Willamette IEPR Panel: Technical Criteria and Areas of Expertise

Technical Criterion	Drury	Glagola	Kulik	Pugh
Hydraulic, Hydrology, and Geomorphology Engineering				
Registered professional engineer with a minimum of 10 years of experience in civil engineering	X			
Knowledge of geomorphology	X			
Knowledge of floodplain restoration	X			
Knowledge of large river engineering projects in complex systems	X			
Experience in large public works projects associated with ecosystem/environmental restoration	X			
Familiarity with HEC-RAS and similar USACE hydrologic & hydraulic computer models	X			
Experience in both computer simulation and physical modeling of large river systems	X			
Active participation in related professional societies	X			
Master's Degree or higher in engineering	X			
Cost Engineering				
A minimum of 10 years of experience with environmental and ecosystem restoration cost estimates, construction schedules, and contingencies		X		
Familiarity with USACE project cost and risk analysis methods and estimating systems		X		
Capable of conducting USACE safety assurance reviews (SARs) as described in ED 11665-2-209, Appendix D, Para. 2.c(3)		X		
Registered professional engineer		X		
Active participation in related professional societies		X		

Table 2. Willamette IEPR Panel: Technical Criteria and Areas of Expertise (continued)

Technical Criterion	Drury	Glagola	Kulik	Pugh
Environmental Compliance/Biology				
A minimum of 10 of years demonstrated experience in anadromous fish habitat restoration in the Pacific Northwest			X	
Experience in habitat restoration			X	
Experience with National Environmental Policy Act requirements (NEPA)			X	
Experience in Endangered Species Act consultation and coordination activities			X	
Active participation in related professional societies			X	
Master's degree in biology or similar field			X	
Civil Works Planning				
A minimum of 10 years of planning experience				X
Familiar with USACE Civil Works planning policies, methodologies, and procedures				X
10 years of experience working directly with or for the USACE on Civil Works projects with an emphasis on floodplain management and ecosystem restoration				X
Experience with large USACE ecosystem restoration projects				X
Experience with ecosystem models such as HEP				X
Experience in incremental cost/cost effectiveness analysis				X
Experience with IWR Planning Suite				X
Active participation in related professional societies				X
Master's degree in a relevant field such as planning or economics[a]				

[a] Waiver statement presented to, and approved by, USACE

Tracy Drury, P.E.

Role: Hydraulic, Hydrology, and Geomorphology Engineering
Affiliation: Anchor QEA, LLC

Mr. Drury is a principal hydraulic engineer at Anchor QEA, LLC with 15 years of applied experience in fluvial geomorphology, hydraulic engineering, and fisheries science. He earned his M.S. in civil and environmental engineering from the University of Washington in 1999 and is a registered professional engineer in Oregon, Washington, Idaho, Missouri, and New York. Mr. Drury has provided geomorphic assessments and analyses of more than 10 projects involving river systems in the Pacific Northwest Region of the U.S., including the Willamette River Geomorphic Analysis and Bank Stabilization Conceptual Design, Grays River Restoration Project, and multiple projects on the Skagit River.

Mr. Drury has experience in designing large river engineering projects in complex systems, has evaluated floodplain conditions, and has designed restoration actions to restore, enhance, and improve connectivity in river systems. He was the technical lead for the Willamette River Geomorphic Analysis and Bank Stabilization Conceptual Design for Pope and Talbot, responsible for evaluating channel migration and sediment transport dynamics near river mile 150. His team identified channel migration history, patterns, and characteristics as well as historic and likely future sediment deposition patterns. Mr. Drury is also familiar with secondary channels in large river systems and has designed side channel projects on many large rivers including the Tucannon, Methow, Skagit, Wenatchee, Entiat, Stillagumish, and Grays Rivers. He was also responsible for developing a professional learning course for the National Highway Institute that included ecologically friendly bank stabilization, channel and restoration design, and floodplain connectivity and ecological value.

Mr. Drury's experience in large public works projects associated with ecosystem and environmental restoration includes the Otter Point Restoration Project, CREST, Lewis and Clark River, Oregon, where he led the development of a two-dimensional hydrodynamic model, restoration plan alternatives, and the design and development of final plans and specification for the final preferred alternative. Project objectives included floodplain restoration, increasing instream salmon habitat through this connectivity, and enhancing riparian conditions through native plantings. Other studies for which he was the principal investigator include the Upper Green River Ecosystem Restoration Study King County, Washington, USACE Seattle District; and the Washington State Department of Transportation, Naches River Reach Analysis and Management Plan, for Yakima County, Washington.

Mr. Drury is familiar with HEC-RAS and similar USACE hydrologic and hydraulic computer models, and has participated in modeling studies for projects such as the Upper Green River, Hazel Hole, and Steelhead Haven. He has extensive experience with computational models and is familiar with the physical modeling of large river systems. Additionally, he is an active member of the American Society of Civil Engineers, River Restoration Northwest, and the Washington Hydrologic Society.

Charles Glagola, Ph.D., P.E.

Role: Cost Engineering
Affiliation: University of Florida

Dr. Glagola is an associate professor in the Department of Civil Engineering at the University of Florida and a licensed professional engineer in Alabama and Florida. He earned his Ph.D. in civil engineering from Clemson University in 1993 and has 40 years experience in civil design and construction cost engineering. Dr. Glagola specializes in construction cost engineering and management, with both practical and academic experience in project cost and risk analysis methods and estimating systems. He has almost 10 years of experience as a project engineer/manager and estimator in private industry, and has also founded a general construction firm that built both private and governmental projects, including heavy civil construction projects. As a consultant, he has designed site drainage for land development projects and followed best management practice (BMP) principles regarding environmental and hydrological considerations. Cost estimation, construction scheduling, and application of contingencies based on risk have been integral facets of these studies.

As a professor, Dr. Glagola teaches undergraduate and graduate courses in project cost estimating, engineering cost estimating, construction planning and scheduling, engineering ethics, legal aspects of engineering, value engineering, systems engineering and construction planning and scheduling. In addition, he has developed a risk analysis graduate course,

Dr. Glagola has co-authored more than 20 articles, publications, and books related to professional engineering.[3] He is familiar with USACE safety assurance review (SAR) as described in EC 1165-2-209, Appendix D, paragraph 2.c(3) and has conducted SAR reviews for USACE projects such as the Louisiana Coastal Area Ecosystem Restoration 6 (LCA6) projects. He has served as a construction and cost engineering panel expert on previous USACE IEPRs, is an active member of ASCE, and is the editor emeritus of the ASCE Journal of Leadership and Management in Engineering (LME).

Brandon Kulik

Role: Environmental Compliance/Biology
Affiliation: Kleinschmidt Associates

Mr. Kulik is a senior fisheries biologist with Kleinschmidt Associates. He received his M.S. in Aquatic Zoology from DePauw University in 1978 and is trained by the U.S. Fish and Wildlife Service in the development of Fish Passageways and Diversion Facilities and Instream Flow

[3] Example publications include:
Collier, C.A., and C.R. Glagola. Engineering Economic and Cost Analysis. 3rd edition. Addision, Wesley, Longman, Publishers, San Francisco, 1998.
Agdas, C.R. Glagola, and Ellis. Comparative analyses of factors affecting predictive accuracy of engineers' estimates for transportation construction projects. (Submitted to The Journal of The American Association of Cost Engineers, June 2009.)

Incremental Methodology habitat modeling. Mr. Kulik has 35 years of experience in the design, execution, and review of environmental studies, with extensive dam and fish passage design experience in the Northeast, Midwest, and Pacific Midwest regions of the U.S. Mr. Kulik has worked on projects such as the Crooked River, Prineville, Oregon, for Portland General Electric; the Merced River, California, for Pacific Gas & Electric; and the Maine Atlantic Salmon Conservation Plan Basin-Wide Instream Flow Studies, for Maine State Planning Office, Augusta, Maine. These projects reflect his knowledge of many aspects of fish habitat design, restoration, and modeling that focus on instream flow affects on habitat, barrier removal, stream channel design, movement, and behavior of anadromous fish.

Mr. Kulik has performed NEPA analyses and has worked extensively on Federal permitting for Federal Energy Regulatory Commission hydroelectric dams and highway projects requiring NEPA analysis for studies including the Bar Mills Project Fish Passage Assessment, for FPLE Maine, Augusta, Maine. He is also experienced in Endangered Species Act (ESA) consultation and coordination activities and has worked on ESA consultation on behalf of private and public sector clients on such studies as the Lower Clark Fork River, Missouri, where he worked collaboratively with the State of Missouri, Idaho agencies, the U.S. Fish and Wildlife Service, and hydropower interests.

Mr. Kulik has published and presented papers at professional meetings on habitat-based instream flow regulation, fish entrainment and passage, habitat protection, instream flows, riverine fish community dynamics, and estuarine ecology. He has also served as a peer reviewer for the journal Rivers, the North American Journal of Fisheries Management, several EPRI reports on fish entrainment, the Congressional Office of Technology Assessments' "Fish Passage Technologies," and the 2007 NOAA Barrier Removal Monitoring Guidelines. Mr. Kulik has served as an environmental compliance/fisheries biologist panel expert on previous USACE IEPRs. He actively participates in related professional societies, is an active member of the American Fisheries Society (AFS), and is a recent past president of the Atlantic International Chapter of AFS.

Steven Pugh

Role: Civil Works Planning
Affiliation: Independent Consultant

Mr. Pugh is an independent consultant with 20 years of direct planning experience including seven years with the USACE Baltimore District Planning Division. He earned his B.S. in natural resources management from the University of Maryland in 1997 and is a graduate of the USACE Planning Associates Program. He is an expert in the field of ecosystem restoration, Civil Works planning, plan formulation, and the evaluation of ecosystem restoration projects and watershed studies. Mr. Pugh worked for the USACE Baltimore District Planning Division - Civil Works Branch for seven years. He was a PROSPECT course instructor for the course "Planning for Ecosystem Restoration" and is knowledgeable of current in civil works planning policies, methodologies, and procedures. He is also practiced in the development and application of ecosystem models such as HEP and has worked on large USACE ecosystem restoration studies such as the Chesapeake Marshlands Restoration Study, which is evaluating the restoration of up

to 20,000 acres of marsh lands, the Lower Potomac River Watershed Study, and the Anacostia River Watershed Restoration Comprehensive Plan.

Mr. Pugh is proficient in the application of the IWR Planning Suite and used it on USACE studies as an employee of the Baltimore District. He also assisted in instructing the IWR Planning Suite module for the PROSPECT course "Planning for Ecosystem Restoration," and participated on the External Independent Technical Review team for the IWR Planning Suite Multi-Criteria Decision Analysis Module. In addition, he has participated in incremental cost/cost effectiveness analysis on many Civil Works planning studies as a planner and ecologist with the USACE Baltimore District and has taught modules on CE/ICA in the context of watershed and ecosystem restoration studies for the PROSPECT course. Mr. Pugh has been a panel member on several IEPR teams reviewing large scale ecosystem restoration studies and is an active member of the Society for Ecological Restoration.

5. SUMMARY OF FINAL PANEL COMMENTS

The panel members agreed among themselves on their "assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used" (USACE, 2012a, 2012b; p. D-4) in the Willamette River review documents. They agreed that the process for selecting alternatives for the recommended restoration plan was well presented and supported. However, they also agreed that additional information should be provided to further support the alternatives selection process, cost engineering, and how the recommended plan will meet the project objectives. Table ES-1 lists the Final Panel Comments statements by level of significance. The full text of the Final Panel Comments is presented in Appendix A of this report. The following summarizes the Panel's findings.

Plan Formulation – The planning reflected in the Willamette River Draft Integrated FR/EA is thorough and logical. The planning tools and models employed in the process were applied appropriately and effectively. The alternative plans were formulated and compared in a balanced platform that adequately accounted for ecological principles while considering real world constraints. The planning was conducted in a collaborative environment and resulted in a high quality and realistic recommended restoration plan.

However, the monitoring and adaptive management plan does not include the details necessary to promote optimum usefulness during project development and the monitoring period. The Panel believes the monitoring protocols should be specific and based on accepted standard procedures as documented in the peer-reviewed literature, such as Measuring and Monitoring Biological Diversity: Standard Methods for Amphibians (Heyer et al. 1994) or the Stream Barrier Removal Monitoring Guide (Collins et al. 2007), or based on the best professional judgment of a team of local experts. The methods should be focused on determining whether project objectives are being achieved. Established targets should be correlated to projected ecological outputs to ensure that appropriate adaptive management measures will be implemented when necessary to achieve the stated project objectives.

Engineering – The analysis tools and methodology are suitable and commonly used for this type of application. The level of analysis conducted is adequate for this level of design. However, more detailed hydraulic and geomorphic analyses are necessary to refine the design and optimize project objectives. Project implementation should produce immediate beneficial geomorphic effects, but the long-term benefits are uncertain and require additional evaluation. A better understanding of historic bedload quantities and the importance of bedload to natural geomorphic process in the reach is necessary to evaluate and understand the long-term expected conditions.

Economics – The project cost considerations are well planned and executed for this project. The selection of alternatives is very well done, simple, straightforward, and easily followed. The presentation of costs for the alternatives is especially well done and made it much easier for the Panel to understand the alternatives selection process. However, the Panel has concerns about the level of detail given in explaining the cost analysis methods used, including the selection of contingency values, the discount rate to be applied over time, and the method for calculating annualized cost values.

Environmental – The environmental components of the recommended restoration plan are adequately scoped and address the key biological objectives. The Panel found that measures pertaining to invasive species management and large woody debris (LWD) establishment may not be self-sustaining and require perpetual maintenance. It is not clear how this will be addressed. The monitoring and adaptive management plan does not provide adequate details to confirm that applicable metrics will be developed for evaluating the success of the project goals. The Panel also believes that the understanding of the report would be enhanced by briefly summarizing why other non-engineering alternatives such as dam operation (e.g., hydrologic modification) were eliminated from consideration during earlier phases of this project and by clearly describing how the specific habitat restoration elements fulfill endangered species Primary Constituent Element (PCE) requirements.

Table 3. Overview of 15 Final Panel Comments Identified by the Willamette River IEPR Panel

No.	Final Panel Comment
Significance – High	
1	Certain design features of the recommended restoration plan may not be self-sustaining and may require perpetual maintenance.
2	The long-term benefits of floodplain connectivity and natural processes cannot be determined because the degree to which the sediment, gravel, and wood supply has been reduced and the importance of this supply to meeting project objectives are not clear.
Significance – Medium	
3	The transport of wood and gravel from above the dams is identified as a restoration opportunity but not carried forward into the development of restoration alternatives.

Table 3. Overview of 15 Final Panel Comments Identified by the Willamette River IEPR Panel (continued)

No.	Final Panel Comment
4	It is not clear how certain alternatives, such as dam operation modification, were removed from consideration for this study.
5	It is not clear how the "bullfrog constraint" was used in the formulation of project alternatives, nor is it clear how maintaining a depth of less than 6 feet will minimize bullfrog habitat.
6	Potential limitations in channel bank or bedform survey data may yield hydraulic model results that are not representative of current conditions.
7	The monitoring and adaptive management plan does not fully explain how project targets were derived or if successfully meeting targets is an indication that the proposed project benefits are being met.
8	Monitoring and evaluating the biological and physical responses may not be possible based on the proposed monitoring plan protocols.
9	Expected impacts on the existing fringe wetlands from implementing the recommended restoration plan have not been quantified, and there is no description of how these impacts will be addressed.
10	The Primary Constituent Elements of the targeted species that are listed under the Endangered Species Act are not specifically linked to elements of the recommended restoration plan.
11	The basis for the selected discount rate of 3.75% for the economic analysis and costing for the life of the project is not explained, and a sensitivity analysis is not provided to demonstrate potential differences in total project costs if the discount rate changes over time.
	Significance – Low
12	The basis for the contingencies applied in the cost analysis is not explained.
13	The Work Breakdown Structure in the Project Cost Summary does not provide enough detail to identify how the costs are being distributed across the different work elements.
14	The rationale for non-ecologically based decisions and whether they affected the selection of the recommended restoration plan is not discussed.
15	There are inconsistencies in the presentation and discussion of project goals and objectives in the documentation.

6. REFERENCES

Baldwin, Andrew H (2004). Restoring complex vegetation in urban settings: The case of tidal freshwater marshes. Urban Ecosystems 7: 125-37.

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Franklin, J.F., and C.T. Dyrness (1988). Natural Vegetation of Oregon and Washington. Corvallis, Oregon: Oregon State University Press.

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APPENDIX A

Final Panel Comments

on the

Willamette River Floodplain Restoration Study

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Final Panel Comment 1

Certain design features of the recommended restoration plan may not be self-sustaining and may require perpetual maintenance.

Basis for Comment

The Panel is concerned that certain design features of the recommended restoration plan (e.g., invasive species removal, native species plantings, and large woody debris [LWD] placement) presented in the Willamette River Floodplain Restoration Study Draft Integrated Feasibility Report/Environmental Assessment are not self-sustaining and may require perpetual maintenance. Because the issues being addressed by these floodplain restoration design features are consequences of flow alteration and flow restoration is not included in the project design for the recommended restoration plan, the Panel believes that some other mechanism would be needed to maintain these features. For example, in a natural system, LWD would be imported from upstream during high flow events. In the section of the Willamette River basin where hydrology has been significantly altered and source areas for woody material are blocked by the dams, material that washes away during high flow events will not be replaced by supplemental materials from upstream. Consequently, there may be a need for continued wood loading or other maintenance activities. It may not be possible to realize and sustain project benefits without including continued maintenance in this design feature.

The Panel understands that the restoration work will be a one-time construction engineering event. However, this is implied and not clearly stated. The feasibility report states that invasive species will be removed and that native vegetation will be planted over a period of a few years. However, under a natural flow regime, periodic flooding was likely one reason that invasive species could not be established. In the absence of this mechanism, invasive species may continuously attempt to re-colonize the floodplain. The monitoring and adaptive management plan indicates that the non-Federal sponsor will actively manage the plant community as needed in the future. If active management is viewed as the permanent solution, this should be stated. The monitoring and adaptive management plan should indicate more clearly how sustainability of these design features will be monitored and how potential adaptive management strategies will be implemented.

It also does not appear that the potential of large-scale grazing from Canada geese has been considered. In areas where resident Canada goose populations exist, impacts from goose herbivory on vegetation plantings have been known to be problematic and have resulted in the destruction of the targeted plant species while more aggressive non-native species have persisted (Baldwin 2013).

Significance – High

Absence of a strategy to address continuous design issues without a self-sustaining solution could potentially affect the projected cost to meet the restoration goals or the possibility of reaching all restoration goals.

Recommendations for Resolution

1. Either:
    a. Identify any design features or other mechanisms not clearly evident that are expected to maintain woody debris and keep invasive species under control once established. For example, this may include naturally occurring upstream sources of LWD that existing flows can deliver to the restoration reaches, planting of riparian areas that may in the future generate LWD, or
    b. Identify any costs and associated assumptions required if perpetual maintenance of these design features is in fact is anticipated.
2. If resident Canada goose populations are present in or near the proposed project area, include the potential impacts from goose herbivory in the adaptive management strategy.

Reference:

Baldwin, Andrew H. (2004). Restoring complex vegetation in urban settings: The case of tidal freshwater marshes. Urban Ecosystems 7:125-37.

Final Panel Comment 2

The long-term benefits of floodplain connectivity and natural processes cannot be determined because the degree to which the sediment, gravel, and wood supply has been reduced and the importance of this supply to meeting project objectives are not clear.

Basis for Comment

One of the project objectives discussed in the Willamette River Floodplain Restoration Study Draft Integrated Feasibility Report/Environmental Assessment (FR/EA) is to restore natural ecosystem function and conditions to the Coast and Middle Fork subbasins of the Willamette River. In Sections 3.2.2, Geomorphology, and 6.0, Environmental Baseline, sediment and wood supply are noted as key components, along with other parameters, driving river and floodplain morphology and influencing spatial and temporal patterns of erosion and sedimentation. These same sections of the FR/EA also note that human activities have disrupted natural flow and sediment transport processes by altering the controlling factors, hence altering the rates and types of habitat forming processes.

However, the degree to which sediment, gravel and wood supply has been decreased by past human activities is not clear, as the discussion on existing conditions in Section 6.0, Environmental Baseline, does not include any analysis of current or historic sediment supply or the importance of sediment supply to channel migration and floodplain connectivity. The Panel assumes that only a small fraction of the historic bedload is currently available to the project area. Two of three major tributaries in the Coast Fork and every major tributary in the Middle Fork, which constitute the majority of the sediment supply area in the headwaters, are dammed, and it is not clear to the Panel whether any or all dams are configured with sediment bypass systems for passing bedload or suspended sediments, fitted for systems that are partially working or non-functional, or containing all sediments from the production zone upstream.

While the Panel agrees that the restoration measures will have a positive influence on geomorphic conditions within the reaches where they are implemented, there is concern that these positive influences will be short-lived. Transport and temporary storage of sediment in the active channel is the primary driver creating natural habitat, and the system of dams has likely eliminated the majority of the historic bedload for the system. Without ongoing sediment supply, it is possible that channel incision will persist, and gains in floodplain connectivity will be diminished over time.

Significance – High

If the project does not directly address the issue of sediment, gravel and wood supply, the benefits of the project may not be realized long term.

Recommendations for Resolution

1. Provide an analysis of current and historic sediment, gravel and wood supply conditions.
2. Factor the relevance of sediment, gravel and wood supply into the alternatives evaluation.
3. Discuss the likelihood of channel incision under existing and proposed conditions.
4. Provide a discussion of how long-term benefits will be achieved with respect to sediment, gravel and wood supply.
5. As appropriate, include the transport of wood and gravel as a potential restoration measure and rerun the analyses.

Final Panel Comment 3

The transport of wood and gravel from above the dams is identified as a restoration opportunity but not carried forward into the development of restoration alternatives.

Basis for Comment

One of the Willamette River Floodplain Restoration project objectives is to restore floodplain habitat. The Willamette River Floodplain Restoration Study Draft Integrated Feasibility Report/Environmental Assessment (FR/EA) identifies that habitat complexity in the Willamette River floodplain has been greatly reduced because, "The supply of large wood and gravel are limited and habitat forming processes have been reduced," resulting from dams that have reduced peak flows (Table 4.) The FR/EA establishes the importance of wood and gravel supply to natural systems, and to the project area specifically, and the transport of wood and gravel from above the dams is listed as a restoration opportunity (Table 22, Specific Restoration Problems and Opportunities). However, transport of wood and gravel is not established as a restoration measure (it is not listed in Table 24, Potential Restoration Measures). There is no discussion or reasoning provided for this decision.

Significance – Medium

The process for the selection of the recommended restoration plan is not completely explained because the transport of wood and gravel was established as being important to natural processes and habitat complexity, but it was eliminated from consideration as a potential restoration measure.

Recommendations for Resolution

1. Explain the decision to eliminate the transport of wood and gravel from above the dams as a potential restoration measure.

Final Panel Comment 4

It is not clear why certain alternatives, such as modifying dam operations, were removed from consideration for this study.

Basis for Comment

The Willamette River Floodplain Restoration Study Draft Integrated Feasibility Report/Environmental Assessment (FR/EA) evaluates engineering alternatives for restoring habitat losses caused by past alterations of flow regime in the Willamette River Basin resulting from dam operation. Elements such as connectivity between floodplain pools and the presence of large woody debris (LWD) are important for preserving floodplain habitats, and natural flow regime is partially responsible for maintaining these habitat elements. Restoring natural flow is one approach commonly used for restoring floodplain habitat, including modifying dam operations to achieve a more natural hydrologic and hydrodynamic flow regime throughout the wet months, as well as alterations that may improve the passage of bedload sediments. However, the discussion in the FR/EA presents proposed engineering alternatives without explaining why other potentially more cost-effective operational alternatives, such as restoring river hydrology functions through controlled releases via dam operations, were eliminated from consideration.

During a mid-review teleconference facilitated by Battelle on April 15, 2013 to provide the Panel an opportunity to ask clarifying questions about the review documents and the project, the Project Delivery Team clarified why these options were not brought forward from the Phase I framework planning process and considered further. However, the FR/EA does not explain these decisions. Because dam operation is a root cause of habitat loss, the Panel has determined that added discussion would strengthen the reasoning for the selected alternatives.

Significance – Medium

The reasons for selecting the recommended restoration plan cannot be fully understood without explaining why modifying dam operations, and other potentially more cost-effective alternatives for restoring floodplain habitat, were eliminated from consideration in the early stages of project planning.

Recommendations for Resolution

1. Explain the rationale for not bringing forward or considering the modification of dam operations and any other non-engineering alternatives from the Phase 1 framework planning process as an alternative for restoring habitat to the Willamette River Basin floodplain. Sections 1.4 and/or 1.5 may be appropriate places for this added discussion.

Final Panel Comment 5

It is not clear how the "bullfrog constraint" was used in the formulation of project alternatives, nor is it clear how maintaining a depth of less than 6 feet will minimize bullfrog habitat.

Basis for Comment

The bullfrog is a non-native predator in the Willamette River floodplain that is one of the factors that inhibits the recovery of the Oregon chub in the Willamette River system (Willamette River Floodplain Restoration Study Draft Feasibility Report/Environmental Assessment [FR/EA], p. 55) and has resulted in the decline of other native frog and fish species (FR/EA, pp. 72, 76, 80). The FR/EA states, "…the bullfrog was instead used as a constraint in the formulation of the alternatives to design conceptual projects that would specifically reduce bullfrog habitat (i.e., perennial ponds with depths greater than six feet)" (p. 116), and the bullfrog is used as a negative component in the Habitat Evaluation Procedure (HEP) Habitat Suitability Index (HSI) model so that restoration alternatives with negative effects on the bullfrog would score more highly. However, the FR/EA does not define the "bullfrog constraint" or provide details on how the constraint was used in the evaluation of alternative plans.

The report also states, "Oregon chub also requires perennial ponds or sloughs, but generally uses waters less than 6 feet in depth, so the focus to reduce bullfrog habitat is to design features that reduce the depth of perennial ponds or slough channels…" (p. 116). The document does not clarify if the depth of 6 feet is derived from specific habitat requirements for the Oregon chub, the bullfrog, or a combination of both. It appears that the presence of the bullfrog has a negative impact on the targeted habitat goals primarily due to predation; however, there is no detailed information to explain how bullfrog habitat has been addressed in the feasibility study, or which of the targeted species the bullfrog is expected to prey on.

Significance – Medium

The alternatives analysis process is not clearly supported without specific information regarding how the bullfrog constraint was used in the HSI model for evaluating alternative restoration plans.

Recommendations for Resolution

1. Define the bullfrog constraint. For example, optimal bullfrog breeding and reproduction habitat requires "x" depth of water for "x" period of time.
2. Indicate how the bullfrog constraint was used during plan formulation and evaluation.
3. Include more detail to explain how the bullfrog constraint was used in the evaluation of restoration alternatives.
4. Clarify the relationship between the bullfrog and the targeted species.
5. Indicate which of the targeted species the bullfrog is expected to prey on.

Final Panel Comment 6

Potential limitations in channel bank or bedform survey data may yield hydraulic model results that are not representative of current conditions.

Basis for Comment

The data used for hydraulic and hydrologic (H&H) modeling presented in the Willamette River Floodplain Restoration Study Draft Integrated Feasibility Report/Environmental Assessment were compiled from various studies, years, and collection methods. Datasets that are compiled from multiple studies have limitations, including how representative the data may be, given how long ago they were collected. The primary concern is the degree to which the channel banks or bedforms have changed since the data were collected and how those changes may affect the results. For example, if a flood event or significant bed-moving event changed the channel or bedform considerably, using data collected prior to the event would likely yield model results that are not representative of current conditions.

Using data that are not representative of existing conditions could result in over- or under-predicting water surface elevations, instream velocities, expected future conditions, or affect the accuracy of future effectiveness monitoring.

Significance – Medium

Without a discussion of how well the survey data used for the H&H modeling represents current conditions, the level of uncertainty associated with the hydrology and hydraulic analysis cannot be fully understood.

Recommendations for Resolution

1. Describe the relevance of the channel bank and bedform data used in the hydraulic model.
2. If data used were collected prior to a significant hydrologic event (e.g., a flood event), spot check to confirm data are still representative of current conditions.

Final Panel Comment 7

The monitoring and adaptive management plan does not fully explain how project targets were derived or if successfully meeting targets is an indication that the proposed project benefits are being achieved.

Basis for Comment

The Willamette River Floodplain Restoration Study Draft Integrated Feasibility Report/Environmental Assessment lists potential items of risk and uncertainty (Table 35, Section 6.8, pp. 146–147). One item is the possibility of proposed fish and wildlife benefits not being realized. One of the mitigation measures proposed to address this risk is to "…develop [a] detailed monitoring and adaptive management plan to document primary success metrics." The monitoring and adaptive management plan includes targets, monitoring protocols, and adaptive management triggers for each of three project objectives. However, the plan does not clearly indicate how the project targets were developed and if they are correlated to Habitat Suitability Indices (HSIs) used in the Habitat Evaluation Procedures (HEP) platform for evaluating the ecological benefits of the potential alternatives (i.e., whether a specific target correlated with a specific HSI value).

For example, under project objective number 1 (p. 181), "Restore lost historic channel complexity and diversity," three targets are given using a variety of percentages and timeframes:

1. Target 1 – Increase pool habitat… by 25% by 2020
2. Target 2 – Increase large woody debris (LWD) abundance….by 50% by 2020
3. Target 3 – Increase diversity of habitat unit types…by 25% by 2025

The monitoring and adaptive management plan does not explain how the percentages and timeframes correlate to the projected ecosystem outputs derived during the planning process. It also does not explain whether not achieving those percentages is an indication of whether the proposed project benefits are being achieved.

Significance – Medium

Explaining how the established targets were derived and describing the correlation between the targets and the projected ecosystem outputs will clarify the purpose and effectiveness of the monitoring and adaptive management approach.

Recommendations for Resolution

1. Explain how each project target in the monitoring and adaptive management plan was developed and how each correlates to the projected outputs of the recommended restoration plan for all three project objectives, including quantifiable elements such as percentages and timeframes.
2. Explain how it will be determined whether proposed project benefits are being achieved.

Final Panel Comment 8

Monitoring and evaluating the biological and physical responses may not be possible based on the proposed monitoring plan protocols.

Basis for Comment

It is not clear to the Panel that the monitoring approach for the monitoring and adaptive management plan presented in the Willamette River Floodplain Restoration Study Draft Integrated Feasibility Report/Environmental Assessment will allow determination of whether restoration objectives are being met for certain biological and physical responses. This could result in missed adaptive management opportunities.

For example, one value of the restored habitat is to provide nursery areas for recovering salmon species, thus parr and smolt production is a valid measure of success. However, the monitoring protocol does not specify which fish species or life-history stages will be monitored or the frequency of monitoring other than to say that, “Sampling will occur every two weeks during the connection period (i.e., October through June) and include at least one night-time sampling per month” (Section 10, p. 182). The monitoring and adaptive management plan indicates that other monitoring will occur at 1, 5, and 10 years. The monitoring and adaptive management plan also indicates that methods such as fyke nets, seining, and/or electroshocking will be used.

Fish population monitoring frequency should ideally be annual or at least occur more frequently than at 5-year intervals in order to determine whether salmon populations are recovering. The frequency of fish population monitoring could be designed to determine parr densities of salmonid fish at reasonable intervals, and the spatial and temporal monitoring frequency should be stated in the monitoring plan. In addition, smolt trapping could be used to evaluate the number and size of smolt being produced within the area. Otherwise, it may not be feasible to effectively determine if the restoration elements are successful in promoting recovery of fish populations.

Hydrologic events such as high flows may also affect stream features such as gravel bars or large woody debris (LWD) jams. The monitoring plan should include scope to evaluate how these events have physically affected (or benefited) the project. Changes to geomorphology and LWD should be monitored after hydrologic high flow events occur. To determine whether restoration goals are being met, increased monitoring frequency or additional monitoring may be necessary, including monitoring channel stability, growth or loss of LWD, snags, and channel geomorphology.

Significance –Medium

Without fully explaining the approach and methods in the monitoring and adaptive management plan and how the monitoring data will help determine whether restoration goals have been met, the protocol is incomplete and may not effectively inform the adaptive management plan.

Recommendations for Resolution

1. Clearly identify specific evaluation goals for biological and physical responses in the monitoring plan and how they are linked to restoration goals. Include a brief discussion linking specific Primary Constituent Elements for salmon recovery to specific elements in the alternative and how these will be documented, and also linking to any potential biological recovery criteria in the salmon recovery planning documents (e.g., smolt densities or number of returning adults, etc.).
2. Add survey sections across the floodway and through the active channel to document changes in floodplain connectivity and identify potential negative outcomes such as channel incision.

Final Panel Comment 9

Expected impacts on the existing fringe wetlands from implementing the recommended restoration plan have not been quantified, and there is no description of how these impacts will be addressed.

Basis for Comment

The Willamette River Floodplain Restoration Study Draft Integrated Feasibility Report/Environmental Assessment (FR/EA) states, “There are wetlands present on all of the sites, primarily associated with the existing gravel mined ponds (fringing wetlands around the ponds) and in floodplain overflow channels.” The document goes on to say that, “During construction, some wetlands will be disturbed” (Section 7.6, p.163), however, no information is provided regarding how existing wetlands will be impacted by implementing the recommended restoration. The FR/EA indicates that wetland delineations will be conducted during the design phase of the project and the quantity of wetlands to be removed will be determined at that time (Section 7.6, p. 163). However, preliminary information such as where wetlands are most likely to be impacted, the approximate percentage of wetlands that will be impacted, the general quality and species composition of the wetlands that will be impacted, and how wetland species composition may change would provide a better understanding of the anticipated impacts from construction. Furthermore, no information is provided regarding how these impacts will be addressed (i.e., whether impacted wetlands will be restored at the same location or at another location).

Significance –Medium

The lack of qualitative or quantitative information on the existing fringe wetlands and how they may be affected by implementation of the recommended restoration plan limits the understanding of the significance of the potential impacts from construction and how they should be addressed.

Recommendations for Resolution

1. Provide quantitative and/or qualitative information on the composition of the plant community and the condition of the existing wetlands that may be impacted by construction. For example, explain whether the existing wetlands are composed of mostly native plants that provide high quality habitat, if they are primarily low quality habitat composed of non-native species, or if there is a mix of both high and low quality wetland habitat. If there is a mix of both, provide estimates of the relative percentages of high and low quality habitat.
2. Provide information regarding where existing wetlands are most likely to be impacted and quantitative information regarding the amount of existing fringe wetlands that may be impacted by implementing the recommended restoration plan.
3. Explain how and where impacted wetlands will be restored.
4. Explain whether changes in wetland class and/or habitat types are anticipated as a result of the project.

Final Panel Comment 10

The Primary Constituent Elements of the targeted species that are listed under the Endangered Species Act are not specifically linked to elements of the recommended restoration plan.

Basis for Comment

The Willamette River Floodplain Restoration Study Draft Integrated Feasibility Report/Environmental Assessment (FR/EA) indicates that floodplain restoration will directly benefit targeted species, and states (p.9):

> "The purpose of this floodplain restoration feasibility study is to restore natural floodplain ecosystem functions along the lower Coast and Middle Forks of the Willamette River. These functions include fish and wildlife habitat, groundwater recharge, incidental flood storage, and sediment and erosion processes. This project is needed because of the need to restore large floodplain sites to contribute to the recovery of sensitive fish and wildlife species in the subbasins."

Because many of the targeted species are listed under the Endangered Species Act (ESA), the Panel believes it is important to explicitly state how the recommended restoration plan will benefit these species. Recovery of fish populations in the Willamette River basin listed under the ESA is linked to the goals of the recommended restoration plan by Primary Constituent Elements (PCEs), which are habitat elements that are essential or critical to the recovery and proliferation of the targeted species. It can be inferred that the PCEs identified for these species will benefit from the recommended restoration plan; however, the FR/EA does not describe the PCEs in a way that clearly and explicitly links specific PCEs to proposed habitat improvements to support how the selected alternatives will directly benefit the targeted species.

Significance – Medium

Including a discussion of how PCEs will be addressed by each of the alternatives selected for the recommended restoration plan will more clearly demonstrate the purpose of each alternative and help inform the scope of the monitoring and adaptive management plan.

Recommendations for Resolution

1. Include a brief discussion of, or reference to, how the alternatives selected for the recommended restoration plan will affect the PCEs related to recovery of the affected ESA species.
2. Incorporate the PCEs into the narrative describing specific habitat improvements and applicable monitoring plans.

Final Panel Comment 11

The basis for the selected discount rate of 3.75% for the economic analysis and costing for the life of the project is not explained, and a sensitivity analysis is not provided to demonstrate potential differences in total project costs if the discount rate changes over time.

Basis for Comment

The discount rate chosen for use in the economic analysis in the Willamette River Floodplain Restoration Study Draft Integrated Feasibility Report/Environmental Assessment introduces an uncertainty in the estimate of the total project costs. The discount rate is usually determined by applying generally accepted economic methodology to estimate the average interest rate over the period in question, in this case, the life of the project. The current FY13 Federal discount rate of 3.75% was chosen for the 50-year economic analysis period of this project (Section 5.6.2, p. 122). Typically, this would be the discount rate used in determining annualized cost (average annual costs) over extended periods of time. The discount rate of 3.75% seems somewhat low as an average when considering a 50-year analysis period. The Panel did not find any sensitivity analyses of the effect of applying different discount rates.

The report states that, “The cost estimated for each alternative is divided by 50 to yield an average annual cost that can be used with average annual habitat units” (Section 5.6, p. 119). This is not consistent with generally accepted engineering economic methods, and the reason for using this alternative approach is not explained. The Panel could not find calculations for determining annualized costs that were based on the engineering economics concept of time-value-of-money (i.e., the change in the value of money over the 50-year period based on applying a compound interest rate of 3.75%).

Significance – Medium

Whether the methods for the cost engineering analysis are appropriate cannot be determined because the methods used for estimating changes in cost over time are not explained.

Recommendations for Resolution

1. Explain how the discount rate was selected.
2. Include a sensitivity analysis to show the impact of using different discount rates on total project costs.
3. Include time-value-of-money for determining annualized costs rather than dividing by 50 to yield an average annual cost or explain why the accepted engineering concept of time-value-of-money was not used in determining annualized costs.

Final Panel Comment 12

The basis for the contingencies applied in the cost analysis is not explained.

Basis for Comment

Contingency percentages are applied to different costs as well as to project time (schedule) in the Willamette River Floodplain Restoration Study Draft Integrated Feasibility Study/Environmental Assessment, and these appear to be very well done. However, the basis for the cost contingencies is not clearly explained, and the magnitude of this cost contingency (33.8%) seems excessively large considering there likely will not be significant design changes. There is a disclaimer (Executive Summary [ES], p. 2) related to the size of the contingency added that states, "the Portland District Cost Estimating Section considers the "high" level of contingency to be appropriate at this time." This statement is very well placed, however, the document does not explain which cost elements are uncertain at this stage of project development, why the level of uncertainty associated with these cost elements is considered to be high, and how these cost elements and contribute to the 33.8% contingency. The application of cost adjustments for risk, such as increasing costs by a risk-determined percentage (i.e., the contingency) is very important because it can significantly impact total project costs, and the basis for the contingency should be explained to support the contingency value selected.

Furthermore, at one place in the Project Cost and Schedule Risk Analysis Report, the contingency to be applied to the baseline project cost is given as 24.5% (ES Section 6.2, Table ES-1). This percentage is given as the baseline cost contingency at the 80% confidence level that is used for this project and initially seems to conflict with the 33.8% contingency. In the Executive Summary (Table ES-1), however, there is an indication that a contingency of 33.8% is to be applied to all costs, and later in ES Section 7.2.1, there is a clarifying statement that the 33.8% is the total contingency to be applied and that 24.5% included in this figure represents "cost growth potential." However, the other contingencies contributing to the 33.8% are not provided. It would be helpful to explain all of the contingencies that contribute to the 33.8% early in the Project Cost and Schedule Risk Analysis Report as well as the basis for each of those contingencies. A table showing all of the contingencies that contribute to the 33.8% contingency would also help clarify how the 33.8% contingency was selected.

Significance – Low

Support for the cost estimates will be improved if the reasons for using excessively large values for contingency costs are explained and all of the contingencies that contribute to the total contingency are provided.

Recommendations for Resolution

1. Provide a breakdown of the cost elements and their percentages that are uncertain and how they are included in the final total of the 33.8% cost contingency to be added to all project costs.
2. Explain why these cost elements are not finalized to the extent that the contingency could be more accurately determined at a value perhaps less than 33.8%.

Final Panel Comment 13

The Work Breakdown Structure in the Project Cost Summary does not provide enough detail to identify how the costs are being distributed across the different work elements.

Basis for Comment

The Cost Analysis (Appendix C) of the Willamette River Floodplain Restoration Study Draft Integrated Feasibility Report/Environmental consists of several items including a:

- Preliminary Costs for Conceptual Alternatives (February 2011)
- Draft Cost Estimate Report, which has the Baseline Cost Estimate Narrative for the Total Project Cost Summary (3/1/2013)
- Total Project Cost Summary (dated 3/1/2013).

In the Preliminary Cost sheets for Conceptual Alternatives (pp. C-4 – C-43) and the Total Project Cost Summary sheets for the recommended restoration plan (Enclosure 3, pages 1 – 8), costs are broken out by each of the proposed restoration sites in the study area within the Willamette River basin. However, the Total Project Cost Summary does not show the same level of detail as the Preliminary Cost sheets.

The Preliminary Cost sheets show the costs of each work element (e.g., site preparation, debris removal, install culvert, place woody debris, real estate acquisition), and the same work elements are used and shown for each restoration site regardless of whether that work element is a component for restoration at that site. This allows for comparison of costs across the individual restoration sites and provides information about what work is proposed for each location.

The more recent Total Project Cost Summary only shows costs at a higher level (e.g., project management, planning and environmental compliance, engineering and design, engineering during construction, etc.) without any reference to specific work elements, as in the Preliminary Cost sheets. Therefore, which restoration work elements, and the cost of implementing each of those elements, are being implemented at each of the restoration sites is not clear in the Project Cost Summary. Being able to compare the cost of similar work elements at a high level of detail provides valuable statistical cost information on the total project cost and the work element costs contributed by each restoration alternative and at each restoration site in the recommended restoration plan.

Significance – Low

Providing more detail on the costs of specific work elements in the Work Breakdown Structure would improve the quality of information presented in the Total Project Cost Summary.

Recommendations for Resolution

1. Provide a more detailed presentation of the total project costs that follows the WBS level of detail used to show the Preliminary Costs Developed for Conceptual Alternatives (Appendices C-4 through C-43).

Final Panel Comment 14

The rationale for non-ecologically based decisions and whether they affected the selection of the recommended restoration plan is not discussed.

Basis for Comment

The Willamette River Floodplain Restoration Study Draft Integrated Feasibility Report/Environmental Assessment documents a couple of logical and practical decisions that were made at critical points during the planning process that were not primarily ecologically based:

1. The decision to analyze the Lower Coast and Middle forks separately and then combine the results and
2. The decision to narrow down the number of alternative sites considered to meet the limitations of the IWR Planning Suite.

Good explanations of why these decisions were made are provided. What is missing is a brief statement of why these decisions are not expected to have a negative impact on the outcome of the analysis resulting in the recommended restoration plan.

Significance – Low

The technical credibility of the study documentation would be improved by describing why these two decisions did not impact the selection of the recommended restoration plan.

Recommendations for Resolution

1. Explain how analyzing the lower Coast and Middle Forks of the Willamette River separately and then combining the results for the alternatives analysis does not reduce the quality of the findings from an ecological perspective.
2. Explain how the sites were narrowed down to meet the limitations of the IWR Planning Suite analysis tool without reducing the quality of the findings from an ecological perspective.

Final Panel Comment 15

There are inconsistencies in the presentation and discussion of project goals and objectives in the documentation.

Basis for Comment

There are at least three sections in the Willamette River Floodplain Restoration Study Draft Integrated Feasibility Study/Environmental Assessment that list different project goals and objectives. Table 2 (p. 8) provides one restoration goal with three objectives, as well as two study goals with one and six study objectives, respectively. Section 10 (p.181) lists three project objectives that are similar but slightly different from those listed in Table 2. Section 5.9.1 (p. 137) lists six project objectives, three of which are similar to those in Table 2 and Section 10, but three of which are different.

These sections can be summarized as follows:

Table 2 (p. 8)	Section 10 (p. 181)	Section 5.9.1 (p. 137)
Restoration Goal 1: Restore natural floodplain ecosystem function and condition to the Coast and Middle Fork Subbasins. Restoration Objective 1: Increase channel complexity and diversity Restoration Objective 2: Restore connectivity of river to floodplain habitats Restoration Objective 3: Restore native floodplain habitats, including cottonwood gallery forests, riparian and wet prairie habitats	Project Objectives: 1. Restore lost historic channel complexity and diversity 2. Restore connectivity of river to floodplain habitats 3. Restore and protect native floodplain habitats including riparian and wetland habitats	Project Objectives: 1. Restore channel complexity and diversity 2. Restore the connectivity of the river to floodplain and off-channel habitats 3. Restore and enhance the floodplain habitats (including riparian and wetland habitats) 4. Reduce invasive non-native species, primarily plant species such as reed canary grass and blackberries 5. Contribute to a reduction in water temperatures to meet native species needs by providing more effective connections to the river, shading, and groundwater recharge 6. Contribute to a reduction in bacteria and nutrient loading by providing improved riparian buffers and provide more frequent connections to floodplain habitats that provide nutrient and sediment deposition opportunities during storm events.

The objectives in Table 2 and Section 10 focus on restoration of habitat structure, while Section 5.9.1also includes water quality objectives. These differences would be expected to influence the alternatives analysis and the scope of the monitoring and adaptive management plan.

Significance – Low

Variances in the description of the restoration project goals and objectives may affect the understanding of the purpose of the proposed actions.

Recommendations for Resolution

1. Use a consistent description of the project goals and objectives throughout the report.

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APPENDIX B

Final Charge to the Independent External Peer Review Panel as Submitted to USACE on March 18, 2013

on the

Willamette River IEPR

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Charge Questions and Guidance to the Peer Reviewers for the Independent External Peer Review of the Willamette River Floodplain Restoration Study

BACKGROUND

The Willamette River Basin of western Oregon is a major tributary of the Columbia River and is the tenth largest river in the United States, based on average annual flow. Sensitive fish and wildlife species have been significantly impacted by development and industry along this major river, and alternatives are being evaluated for restoring ecosystem functions to various reaches of the river. This study is being conducted in phases due to the large size and complexity of the Willamette River Basin. Phase 1 of the study involved the development of a framework level plan for the entire Willamette Basin [Willamette Restoration Initiative (WRI) 2004], which documented conditions in the basin and strategies to recover fish and wildlife species as part of the Columbia River Basin Fish and Wildlife Program. Phase 2, the subject of this feasibility study, involves the feasibility study of floodplain restoration opportunities in the lower Coast and Middle Forks of the Willamette River.

The Coast Fork and Middle Fork subbasins are located in the southern portion of the Willamette River Basin. These particular subbasins were chosen for the Phase 2 study for several reasons. First, several opportunities exist below the dams to restore natural floodplain functions. Second, Corps' dams and bank protection projects, among other activities, have significantly altered hydrologic and hydraulic conditions in these subbasins, and it is appropriate for the Corps to take the lead in restoring more natural floodplain functions to these subbasins. Third, the high percentage of public land ownership in these subbasins, as compared to other major tributaries and the mainstem Willamette, increases the likelihood that a cost-effective, integrated restoration plan can be implemented. Finally, there is a high degree of interest in floodplain restoration among stakeholders and potential sponsors in these sub-basins.

The Coast Fork Willamette River subbasin covers an area of about 665 square miles within the Calapooya Mountains (Western Cascades province) and the floor of the Willamette Valley. The river is approximately 40 miles long and joins the Middle Fork Willamette near Eugene to form the mainstem Willamette River. Big River and Saroute Creek in the Calapooya Mountains join to form the Coast Fork Willamette River. The Row River, the largest tributary, drains nearly 60% of the Coast Fork subbasin and joins the Coast Fork Willamette River just below the City of Cottage Grove. Two dams divide the Coast Fork subbasin, Cottage Grove on the Coast Fork Willamette at RM 29 and Dorena on the Row River. These dams limit upstream fish passage and greatly influence downstream hydrologic regimes, temperature patterns, sediment and bedload transport, and large wood delivery to the lower reaches.

This study is focused on the floodplain of the Coast Fork Willamette River below Cottage Grove dam to the confluence with the Middle Fork Willamette River. This lower floodplain area is the primary area of interest for restoring natural floodplain processes and habitats. The lower mile of the Row River is also considered in this study.

The Middle Fork Willamette River subbasin covers an area of approximately 1,360 square miles (865,920 acres) on the western slope of the Cascade Mountains and the floor of the Willamette

Valley. The river is 84 miles long and joins the Coast Fork Willamette River near Eugene to form the mainstem Willamette River. The Middle Fork Willamette River originates in two connecting lakes formed by lava flows: Opal and Timpanogas Lakes in the Willamette National Forest. The headwaters of the subbasin are characterized by two major physiographic provinces: the High Cascades and the Western Cascades provinces (Franklin and Dyrness 1988).

As the leading land use in the subbasin, commercial forestry has contributed to degradation of fish habitat by modifying hydrology and increasing sediment inputs and water temperatures. Mature and old-growth forest currently occupy about 36% of the Hills Creek Reservoir drainage, which has been estimated to be a loss of 55% from historic conditions (NPCC 2004a). The lower subbasin is dominated by agricultural and urban land uses that constrain the river's ability to meander and have resulted in the removal of much of the riparian gallery forest. The North Fork of the Middle Fork Willamette River is a designated National Wild and Scenic River. This study is primarily focused on the floodplain below Dexter dam to the confluence with the Coast Fork Willamette River. This lower floodplain area is the primary area of interest for this study for restoring natural floodplain processes and habitats. The upper subbasin has a narrower valley and floodplain.

The purpose of this floodplain restoration feasibility study is to evaluate alternatives for restoring natural floodplain functions along the lower Coast and Middle Forks Willamette River. These functions include fish and wildlife habitat, groundwater recharge, flood storage, and sediment and erosion processes. This project is essential because of the need to restore large floodplain sites that contribute to the recovery of sensitive fish and wildlife species in the subbasins. Without Federal action, other stakeholders in the subbasins would not have the funds or means to accomplish this same scale of restoration. Because of the substantial changes in natural riverine and floodplain processes due to the construction of multiple dams and revetments in the subbasins, the habitats that sustain fish and wildlife populations are disappearing by becoming degraded or developed. Large-scale restoration of floodplains provides the best opportunity to encourage the natural formation of habitats and provide important off-channel rearing and refuge habitats for multiple species. Floodplains will likely become even more important for dissipating high energy and high flows as climate change occurs. It is likely that winter snowpack in the Pacific Northwest will decline, whereas more variable rainfall will lead to higher peak runoff events and lower sustained flows. Floodplains help moderate peak runoff events and allow groundwater recharge that contributes to the maintenance of low flows.

OBJECTIVES

The objective of this work is to conduct an independent external peer review (IEPR) of the Willamette River Floodplain Restoration Study Integrated Feasibility Report and Environmental Assessment (February 2013) (hereinafter: Willamette River IEPR) in accordance with the Department of the Army, USACE, Water Resources Policies and Authorities' *Civil Works Review* (EC 1165-2-214, December 15, 2012), and the Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* (December 16, 2004).
Peer review is one of the important procedures used to ensure that the quality of published information meets the standards of the scientific and technical community. Peer review typically evaluates the clarity of hypotheses, validity of the research design, quality of data collection

procedures, robustness of the methods employed, appropriateness of the methods for the hypotheses being tested, extent to which the conclusions follow from the analysis, and strengths and limitations of the overall product.

The purpose of the IEPR is to assess the "adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used" (EC 1165-2-214, p. D-4) for the Willamette River documents. The IEPR will be limited to technical review and will not involve policy review. The IEPR will be conducted by subject matter experts (i.e., IEPR panel members) with extensive experience in hydraulic, hydrologic, geomorphologic engineering, cost engineering, environmental compliance/biology and Civil Works planning issues relevant to the project. They will also have experience applying their subject matter expertise to ecosystem restoration.

The Panel will be "charged" with responding to specific technical questions as well as providing a broad technical evaluation of the overall project. Per EC 1165-2-214, Appendix D, review panels should identify, explain, and comment upon assumptions that underlie all the analyses, as well as evaluate the soundness of models, surveys, investigations, and methods. Review panels should be able to evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable. Reviews should focus on assumptions, data, methods, and models. The panel members may offer their opinions as to whether there are sufficient analyses upon which to base a recommendation.

DOCUMENTS PROVIDED

The following is a list of documents, supporting information, and reference materials that will be provided for the review.

Documents for Review

The following documents are to be reviewed by each of the designated disciplines:

Title	Approx. No. of Pages (985 pages total)	Required Disciplines
Willamette River Floodplain Restoration Study, Integrated Feasibility Report and Environmental Assessment, February 2013	207	All Disciplines
Appendix A – Conceptual Alternatives	33	All Disciplines
Appendix C – Cost Appendix	124	Cost Engineer; Civil Works Planner
Appendix E – Hydrology and Hydraulics	103	Hydraulic, Hydrology, Geomorphology Engineer
Appendix F – Design	518	Hydraulic, Hydrology, Geomorphology Engineer; Cost Engineer

Supporting Information

- Appendix B – Planning Models Documentation
- Appendix D – Biological Assessment
- Appendix G – Draft Real Estate Plan
- Appendix H – Public Stakeholder Involvement
- Appendix I – Environmental Compliance Documents

Documents for Reference

- USACE guidance *Civil Works Review,* (EC 1165-2-214, December 15, 2012)
- CECW-CP Memorandum (March 31, 2007)
- Office of Management and Budget's Final Information Quality Bulletin for Peer Review (December 16, 2004)

SCHEDULE

This final schedule is based on the March 4, 2013 receipt of the final review documents. The schedule will be revised upon receipt of final review documents.

Task	Action	Days to Complete Action	Due Date
Conduct Peer Review	Battelle sends review documents to Panel	Within 1 day of Panel being under subcontract or submission of final Work Plan, whichever is later	3/28/2013
	Battelle convenes kickoff meeting with Panel	Within 2 days of Panel being under subcontract or submission of final Work Plan, whichever is later	3/29/2013
	USACE/Battelle convenes kickoff meeting with Panel	Within 2 days of Panel being under subcontract or submission of final Work Plan, whichever is later	3/29/2013
	Battelle convenes mid-review teleconference for Panel to ask clarifying questions of USACE	At the halfway point of Panel review	4/9/2013
	Panel participates in In-Progress Review Meeting (this activity is an Option that has not been awarded)	TBD	
	Panel members complete their individual reviews	Within 7 days of Battelle/Panel kick-off meeting	4/19/2013
Prepare Final Panel Comments and Final IEPR Report	Battelle provides Panel merged individual comments and talking points for Panel Review Teleconference	Within 4 days of panel members completing their review	4/25/2013
	Battelle convenes Panel Review Teleconference	Within 5 days of panel members completing their review	4/26/2013
	Final Panel Comments finalized	Within 5 days of receipt of draft Final Panel Comments	5/15/2013
	Battelle provides Final IEPR Report to Panel for review	Within 2 days Final Panel Comments being finalized	5/17/2013
	Panel provides comments on Final IEPR Report	Within 2 days of receipt of Final IEPR Report	5/21/2013
	*Battelle submits Final IEPR Report to USACE	Within 14 days of panel members providing draft Final Panel Comments to Battelle	5/24/2013

Task	Action	Days to Complete Action	Due Date
Comment/ Response Process	Battelle convenes teleconference with Panel to review the Post-Final Panel Comment Response Process (if necessary)	Within 2 days of submittal of Final IEPR Report	
	USACE provides draft PDT Evaluator Responses to Battelle	Within 10 days of receipt of Final IEPR Report	6/3/2013
	Battelle provides the Panel the draft PDT Evaluator Responses	Within 2 days of receipt of draft PDT Evaluator Responses	6/5/2013
	Panel members provide Battelle with draft comments on draft PDT Evaluator Responses (i.e., draft BackCheck Responses)	Within 3 days of receipt of draft PDT Evaluator Responses from Battelle	6/10/2013
	Battelle convenes teleconference with Panel to discuss draft BackCheck Responses	Within 1 day of receipt of draft BackCheck Responses	6/10/2013
	Battelle convenes teleconference with Panel and USACE to discuss Final Panel Comments and draft responses	Within 5 days of USACE providing draft PDT Evaluator Responses	6/11/2013
	USACE inputs final PDT Evaluator Responses in DrChecks	Within 2 days of Final Panel Teleconference	6/18/2013
	Battelle provides PDT Evaluator Responses to Panel	Within 3 days of final PDT Evaluator Responses being available	6/20/2013
	Panel members provide Battelle with final BackCheck Responses	Within 3 days of receipt of final PDT Evaluator Responses	6/25/2013
	Battelle inputs the Panel's BackCheck Responses in DrChecks	Within 10 days of notification that USACE final PDT Evaluator Responses have been posted in DrChecks	6/25/203
	*Battelle submits pdf printout of DrChecks project file	Within 1 day of DrChecks closeout	6/26/2013

CHARGE FOR PEER REVIEW

As part of the IEPR review, members of this peer review panel are asked to comment on whether the technical approach and scientific rationale presented in the study documents are credible and whether the conclusions are reasonable from the data presented. The reviewers are asked to verify that the technical work is adequate, competently performed, properly documented, satisfies established quality requirements, and yields credible conclusions.

Specific questions relating to the IEPR are included in the general charge guidance that is provided below.

General Charge Guidance

Please respond to the scientific and technical questions listed below and conduct a broad review of the feasibility study report and associated data. Focus should be on your area of expertise and technical knowledge. Not all appendices are provided for review as they are subject to USACE policy review or are part of the permitting documentation subject to review and approval by other regulatory agencies. There are some sections of the report or appendices provided where no questions are associated with them but they are expected to provide background information for the review. Assess the adequacy and acceptability of the economic, engineering and environmental methods, analysis, and plan formulation applied to the study.

1. Comment on the assumptions that underlie economic, engineering, environmental, and plan formulation analyses.
2. Evaluate whether the interpretations of analyses and conclusions are reasonable.
3. Focus the review on factual inputs, data, analyses, assumptions, and other scientific and engineering matters that inform decision makers.
4. Please contact the Battelle Project Manager, Amanda Maxemchuk, for requests or additional information (MaxemchukA@Battelle.org).
5. In case of media contact, notify Battelle's Program Manager, Karen Johnson-Young, immediately (Johnson-YoungK@Battelle.org).
6. Reviewer's names will appear as one of the panel members performing the peer review. Reviewer's comments will be included in the Final IEPR Report, but will remain anonymous.

Key Areas for Review:

A. Baseline condition assumptions
B. Plan formulation and selection of recommended plan
C. Effects of recommended plan
D. Recommendations.

Please **do not** make recommendations on whether a particular alternative should be implemented or whether you would have conducted the work in a similar manner. Also, please **do not** comment on or make recommendations on policy issues and decision-making. Comments should be provided based on your professional judgment, **not** the legality of the document.

1. If desired, panel members can contact one another. However, panel members **should not** contact anyone who is or was involved in the project, prepared the subject documents, or was part of the USACE Agency Technical Review (ATR).
2. Please contact the Battelle Project Manager (Amanda Maxemchuk, maxemchuka@battelle.org) or Deputy Program Manager (Rachel Sell (sellr@battelle.org) for requests or additional information.
3. In case of media contact, notify the Battelle Program Manager, Karen Johnson-Young (johnson-youngk@battelle.org) immediately.
4. Your name will appear as one of the panel members in the peer review. Your comments will be included in the Final IEPR Report, but will remain anonymous.

Please submit your comments in electronic form to Amanda Maxemchuk, maxemchuka@battelle.org, no later than close of business on April 19, 2013.

Independent External Peer Review of the

Willamette River Floodplain Restoration Study, Lower Coast and Middle Forks Subbasins, Oregon

Charge Questions and Relevant Sections as Supplied by USACE

MAIN REPORT

SECTION 1.0 -- INTRODUCTION

1. Is the project's purpose and scope complete and understandable?

SECTION 2.0 – EXISTING PROJECTS AND RELATED STUDIES/PROGRAMS

2. Does this section adequately provide context for the role of this study in relation to other projects and programs listed?

SECTION 3.0 – CHARACTERIZATION OF BASELINE CONDITIONS

3. Comment on whether the special status species and resource areas in the project area have been accurately described.
4. Comment on whether the water resources in the project area have been accurately described.
5. Comment on the adequacy of the environmental and without-project condition summaries in terms of data quality, timeliness of the data, and breadth of information covered.

SECTIONS 4.0 AND 5.0 – PROBLEMS AND OPPORTUNITIES, PLAN FORMULATION

6. Are the problems and opportunities appropriately defined and addressed in this study?
7. Have the alternatives been reasonably formulated? Do they appropriately address the needs and objectives of the project?
8. Comment on the evaluation of alternatives and analyses conducted.
9. Based on your best professional judgment, was the recommended plan appropriately developed and selected?

SECTION 6.0 – RECOMMENDED RESTORATION PLAN

10. Is the description of the recommended plan clearly presented?

11. Comment on the risk and uncertainty elements.

SECTION 7.0 – EFFECTS OF THE RECOMMENDED PLAN

12. Have the environmental effects been adequately described and accounted for?

SECTIONS 8.0 AND 9.0 – SUMMARY OF PUBLIC INVOLVEMENT AND ENVIRONMENTAL COMPLIANCE REQUIREMENTS

13. Public review will occur concurrently with the IEPR. Has adequate stakeholder and agency involvement occurred to identify issues of interest and to solicit feedback from interested parties?

SECTION 10.0 – MONITORING AND ADAPTIVE MANAGEMENT PLAN

14. Discuss if the parameters proposed for monitoring address project objectives to measure success.
15. Discuss proposed adaptive management framework and its adequacy.

APPENDICES FOR REVIEW (OTHER APPENDICES PROVIDED AS BACKGROUND INFORMATION ONLY)

Appendix A – Conceptual Alternatives

16. Do conceptual alternatives include a wide range of potential restoration measures and sites that address the project objectives?
17. Do conceptual alternatives maps present information that is logical and identify which measures are proposed on each site?

Appendix C – Cost Appendix

18. Comment on the overall reasonableness of the detailed cost estimates.
19. Discuss the appropriateness of the explicit or implicit assumptions that are included in the cost estimates and whether assumptions are adequately addressed.
20. Comment on the overall reasonableness of the cost schedule risk analysis.

Appendix E – Hydrology and Hydraulics

21. Comment on the analyses conducted and overall reasonableness of conclusions.

22. Comment on the extent to which the summary is complete and consistent with the detailed analyses shown in this section.

Appendix F – Design

23. Comment on the information provided and overall reasonableness of conclusions.
24. Comment on the risks and uncertainty elements.

General

25. Comment on any other issues that affect the adequacy and reliability of the information on which planning decisions are based.
26. Identify what you consider to be the key issue(s) affecting the adequacy and reliability of the information on which planning decisions are based, if any.